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REMARKS

The Examiner again rejected applicants' claims 1-19. Specifically, the Examiner rejected all claims under 35 USC §112. The Examiner states the claim amendments are not supported by the specification. The Examiner also maintains that claims 1, 2, 7-10, 13 and 14 are anticipated under 35 USC § 102(e). The Examiner cited Balachandran et al. (U.S. Patent No. 5,881,105) as the basis for this rejection. The Examiner also rejected applicants' claims 3-4 and 15-19 as obvious under 35 USC § 103(a). The Examiner cited Balachandran et al. in view of Le Strat et al. (U.S. Patent No. 6,134,220) as the basis for the rejection. The Examiner also rejected claims 5, 11 and 12 under 35 USC § 103, citing Balachandran et al. in view of U.S. Patent No. 5,199,031 to Dahlin and further in view of U.S. Patent No. 6,286,122 to Alanara.

In the present amendment, claims 1-19 are cancelled and claims 20-38 are added. As discussed in detail below, claims 20-38 are introduced to clarify the invention recited in claims 1-19. As such new claims 20-38 are introduced for the purpose of clarity and not for patentablity.

The field of the invention is directed to the signaling of information in a transmission system. The invention is described in the context of, and is applied to, a mobile communications system. In a mobile communications system there is an uplink, defined from a network to a mobile, and a downlink defined from the mobile to the network.

Certain embodiments of the present invention relate to the transmission of signaling information in the downlink and uplink of a mobile communication system. These embodiments are best described with reference to Fig. 2 and the accompanying text at page 6, lines 9 to 16. For convenience, an annotated

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version of Fig. 2 is provided following this description. Specifically, the frame gaps of each frame that are related to the downlink and the frame gaps (i.e. sections) related to the uplink are indicated at the top of the figure. The column headings have been slightly modified to further clarify the purpose of bits in the various frame gaps.

The information in column 2 is the three bit "actual mode signaling codeword for downlink." This is the actual codeword transmitted in a frame of the downlink that represents the coding applied to the data in that frame.

The information in column 3 is the multi-frame signaling bit used for characterizing the coding mode command for the uplink sent in the downlink. Page 6, lines 11-12. These are the multi-frame bits that are sent in the downlink to the mobile, and then used by the mobile as the coding mode commands for an uplink transmission (i.e. transmissions from the mobile). Thus, the multi-frame bits transmitted in the downlink represent the actual coding mode to be used in the uplink. The heading of frame section 3 on annotated Fig. 2 below, provided for pedagogic purposes, is modified to indicate that the mode command bit in the downlink is used to characterize the coding mode for the uplink.
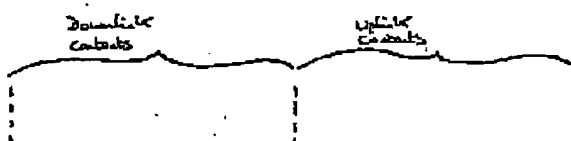
The information in column 4 is the three bit actual mode codeword used for signaling of the coding mode for the uplink. Page 6, lines 13-14. This is the actual codeword transmitted in a frame of the uplink, and it represents the coding applied to the data in that frame.

The information in column 5 is the multi-frame signaling bit of the uplink used for characterizing the transmission quality of the downlink as received and measured by

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the mobile part. Page 6, lines 14-15. These are the multi-frame bits that are sent in the uplink to the network, representing the transmission quality of the downlink. The column header of column 5 in annotated Fig. 2 below is also modified slightly to underscore the relationship between the information in the uplink to the downlink.

Frame Number	actual mode signalling codeword for downlink	mode Command for uplink encoding (bits)	actual mode signalling codeword for uplink	Quality measured in downlink (bits)	Action
0	010 (Mode 3)	0 (LSB)	010 (Mode 3)	0 (LSB) (assumed)	no change of codec mode
1	010 (Mode 3)	1	010 (Mode 3)	1 (assumed)	no change of codec mode
2	010 (Mode 3)	0 (MSB)	010 (Mode 3)	1 (MSB) (assumed)	no change of codec mode, mode command word collected, quality word collected (=110)
3	010 (Mode 3)	1 (LSB)	010 (Mode 3)	1 (LSB) (assumed)	change of codec mode 3 to 2
4	010 (Mode 3)	0	010 (Mode 3)	0 (assumed)	change of codec mode 3 to 2
5	010 (Mode 3)	0 (MSB)	010 (Mode 3)	1 (MSB) (assumed)	change of codec mode 3 to 2, mode command word collected, quality word collected (=101)
6	001 (Mode 2)	1 (LSB)	001 (Mode 2)	1 (LSB) (assumed)	change of codec mode 2 to 4
7	001 (Mode 2)	1	001 (Mode 2)	1 (assumed)	change of codec mode 2 to 4
8	001 (Mode 2)	0 (MSB)	001 (Mode 2)	1 (MSB) (assumed)	change of codec mode 2 to 4, mode command word collected, quality word collected (=111)

Fig. 2

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From this, it can be seen that, in both the uplink and the downlink transmissions, the actual codeword included in each frame represents the coding used in that frame. The multi-frame signaling bits (that is the multiple signaling bits that are portioned and distributed in the frame sections of multiple frames) represent different information in the downlink and the uplink.

In the downlink, the multi-frame signaling bits are transmitted from the network. They comprise the coding mode which the network has determined the mobile is to use. The network determines the actual coding modes for use in both the uplink and the downlink (p. 6, lns. 28-29). These multi-frame bits are received on the downlink by the mobile, and used by the mobile to code the uplink transmissions. In a 'symmetrical' mode of operation the codes used by the mobile are the same as those used by the network, and therefore the mobile could simply use the actual code modes in the frames received in the downlink from the network. Where symmetrical operation occurs, the multi-frame signaling bits introduce a layer of 'protection', with the retrieved multi-frame bits being compared to the actual code modes contained in the downlink frames.

In the uplink, the multi-frame signaling bits are transmitted in the uplink from the mobile. They comprise a representation of the quality of the downlink as measured by the mobile. The bits forming the quality measurement are received from the uplink by the network. See the description at page 5, lines 25 to 27; page 7, lines 1 to 3.

Referring again to annotated Fig. 2 above, as previously noted, columns 2 and 3 represent information transmitted in the downlink, and columns 4 and 5 represent information transmitted in the uplink. Fig. 2 has been further

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modified so that the code words in the fourth column (*i.e.* the uplink) are grouped by the dashed boxes. The arrows from column three (the frame gaps in the downlink) are directed to the dashed boxes in the uplink. This more clearly represents the relationship between the bits distributed among frame sections in multiple frames of the downlink to the code words of column 4 (*i.e.* the uplink code words). This relationship between the bits in frame section 3 (distributed among multiple frames) and the mode signal for the uplink is described on page 7, lines 4-20 of applicants' specification. To underscore this relationship, the heading of column 3 could even more appropriately be modified to "Mode Command Bit for Uplink (sent in downlink)".

Applicants provide the figure below to underscore the concepts described above.

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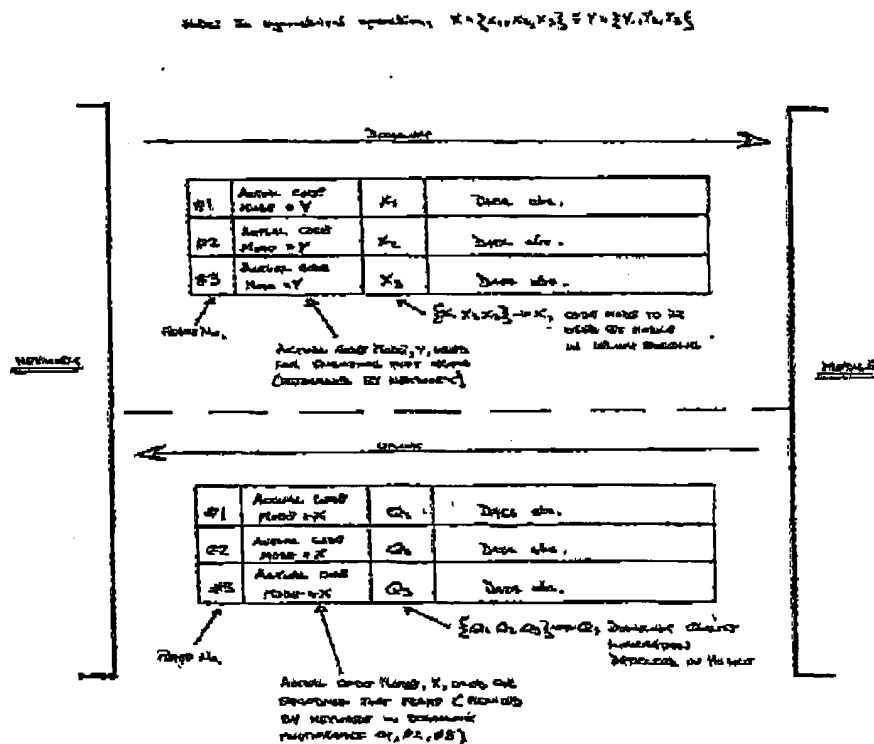
The information in the above figure is consistent with this analysis of Fig. 2. Specifically, the figure illustrates the downlink frame sections of multiple. frames and their corresponding frame sections in the uplink. Note the bits in frame section 3 of frames 1-3 form the actual code mode of frames 1-3 in the uplink. The above figure is described with reference to Fig. 1 of the specification and the description at page 4, line 13 to page 5, lines 19. A downlink transmission is described on page 4, lines 15 to 16.

The user data is coded using one mode of available modes according to the selected coding modes (p. 4, lns. 17-19; p. 5, lns. 4-6). As in the preferred example, six different coding modes are supported. Three bit code words can be used to represent the coding modes (p. 4, lns. 19-20). The selected coding mode is used to channel code data which is already speech coded. At least one additional bit, a portion of the multi-frame signaling information, is also encoded in this frame with the speech. This additional bit is part of a three-bit information word representing additional signaling information (p. 4, lns. 25-26).

The three bit information for the additional signaling information may represent the already described six different coding modes available, or measurement information (p. 4, lns. 27-28). The three bits of the additional signaling information are transmitted one bit at a time in three frames (p. 4, lns. 28-30). ("In this example it takes three frames within a multi-frame of six frames . . . to transmit the coding mode information as within each frame only one of three bits is transmitted, thus providing additional protection for the coding mode information.")

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In the uplink, the respective frames similarly include the actual coding mode used for the respective frame, as coded by the mobile (p.5, lns. 22-24). In addition multi-frame bits are transmitted in three consecutive frames in the preferred embodiment (p. 5, lns. 24-25), as in the downlink. However, the three multi-frame bits represent a quality measurement for the downlink as measured by the mobile (p. 5, lns. 25-27). The three bits allow eight different levels to be represented.

In decoding frames at both the mobile and the network, the codeword used is that transmitted in the frame to be decoded in the respective downlink and uplink (p. 7 lns. 4-9). In symmetrical operation (as illustrated in the above figure), the fact that the uplink and downlink use the same actual code modes $(x = y)$ can be used to introduce a high level of protection. The code word in the received frame at either end of the link should match the code word being used to generate frames at that end of the link (p. 7, lns. 12-20).

The new claims provided with this amendment underscore that the invention is directed to a multi-frame transmission system and that control information is partitioned and distributed among multiple frames. The partitioned and distributed control information is reassembled and used in the downstream link (i.e. the partitioned bits in the downlink are assembled as a codeword in the uplink or the partitioned bits in the uplink are assembled as a codeword and used in the downlink). Support for the new claims is found in the portions of the specification referenced above. Thus, the new claims do not introduce new matter. Furthermore, the new claims are intended to clarify the applicants' invention and do not modify the scope of the invention recited in now cancelled claims 1-19. The new claims underscore that there is a first and second type

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of coding information.   The first represents the coding mode applied in the downlink.   The second represents the coding mode to be applied in the uplink.   *See* new claim 23.

With regard to the Examiner's rejections under 35 USC §§ 102(e) and 103, it is submitted that neither Balachandran nor Le Strat, nor a combination of the teachings of the two documents, suggests a transmission of signaling information in the way recited in the claims.

As noted by the Examiner in point 4.1 of the office action, Balachandran teaches the step of inserting signaling information related to individual frames into the individual frames (col. 3, lns. 45-47).   Balachandran also describes the FACCH as carrying control signals which are 184 bits, which become 456 bits after encoding and are then split into 8 bursts and sent through 8 separate frames.   In Balachadran the FACCH carries the control signals in frames in which the user data/speech for the same user is not carried.

However, there is no suggestion in Balachandran that the same control information should be inserted both into the frame to which it relates and partitioned and distributed among the frames in the multi-frame.   On the contrary, column 3, lines 45 to 47 describes the insertion of synchronizing bits into a transmission burst and column 4, lines 3 to 11 describes the interleaving of control signals in the FACCH, and there is no suggestion that these control signals include synchronizing bits.   Thus, the partitioning and inserting step are only disclosed in Balachandran in respect of different signaling information.   But there is no suggestion in Balachandran that the two steps should be carried out in respect of the same signaling information.   To underscore, with respect to control information, Balanchandran does not disclose or suggest

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partitioning the control information and distributing sections (*i.e.* bits) of that control information among the multiple frames in a multi-frame system as signaling information. It is therefore submitted that new claims 20 through 38 of the present application are novel and inventive over Balachandran.

Le Strat describes a coding mode sent through the FACCH. However, as in Balachandran, there is no suggestion in Le Strat that the coding mode, or indeed any signaling information, should be transmitted in two ways and, in particular, the two ways specified in new claims 20 to 38.

Based upon the foregoing, it is submitted that new claims 20-38 are patentable over Balanchandran or Balachandran in view of Le Strat. Neither Balanchandran et al. or Balachandran *et al.* in view of Le Strat disclose or suggest partitioning a bit sequence of control information that relates to an individual frame <u>and</u> inserting and evaluating this bit sequence of information into the multiple frames of a multi-frame.

As it is believed that all of the rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he telephone applicants' attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge

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Deposit Account No. 12-1095 therefor.

Dated: September 28, 2004   Respectfully submitted,

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